

CLAIMS

What is claimed is:

1. A vehicle equipment rack (100) for removably holding equipment (200) on a shelf (101) that is removably mounted within a vehicle (300), the vehicle equipment rack (100) characterized by:

a hook bar assembly (130) having a guide portion (132), and at least one sliding portion (134) telescopically engaged with the guide portion (132), wherein the hook bar assembly (130) is attached to the shelf (101); and

two end hooks (140) on distal longitudinally outward ends of the hook bar assembly (130), wherein each end hook (140) is configured for hooking on a headrest post (322, 324) of the vehicle (300).

2. The vehicle equipment rack of claim 1, further characterized by:

a manual locking device (186) for holding the hook bar assembly (130) in a fixed telescopic position.

3. The vehicle equipment rack of claim 1, further characterized by:

a spring (172) connected for biasing the two end hooks (140) with respect to each other.

4. The vehicle equipment rack of claim 1, wherein the end hook (140) has a forward opening hook (141, 149) with inside walls including:

a longitudinally straight shank wall (151) that extends longitudinally outward; and

a straight finger wall (152) that extends from the longitudinally outward end of the shank wall (151), and that is angled forward and longitudinally inward relative to the shank wall (151).

5. The vehicle equipment rack of claim 4, further characterized by:

a longitudinally straight tip wall (153) that extends longitudinally inward from the forward end of the finger wall (152).

6. The vehicle equipment rack of claim 1, wherein the end hook (140) has a rearward opening hook (155) with inside walls including:

a longitudinally straight shank wall (157) that extends longitudinally outward; and

a straight finger wall (158) that extends from the longitudinally outward end of the shank wall (157), and that is angled rearward and longitudinally inward relative to the shank wall (157).

7. The vehicle equipment rack of claim 6, further characterized by:

an anti-rotation bar (166) extending longitudinally outward from the rearward opening hook (155) such that a bar wall (167) is parallel to, and approximately collinear with, the shank wall (157); wherein:

the anti-rotation bar (166) is dimensioned to be long enough to reach at least longitudinally outward of an outside headrest post (322) when the rearward opening hook (155) is hooked on an inside headrest post (324).

8. The vehicle equipment rack of claim 1, wherein the end hook (140) has a outward opening hook (160) with inside walls including:

a forward finger wall (161) that extends forward and longitudinally outward, and a rearward finger wall (162) that extends rearward and longitudinally outward;

wherein the forward finger wall (161) and the rearward finger wall (162) are both straight, and are angled relative to each other.

9. The vehicle equipment rack of claim 1, further characterized by:

a socket (135) on the hook bar assembly (130) that opens longitudinally outward;

a latch hole (139) in a lateral inside surface of the socket (135);

a hook portion (149, 155, 160) of the end hook (140);

a peg portion (142) of the end hook (140) extending longitudinally inward from the hook portion (149, 155, 160) wherein the peg portion (142) is configured to fit within the socket (135);

a flange (143) of the hook portion (149, 155, 160) where the hook portion (149, 155, 160) joins the peg portion (142), wherein the flange (143) is laterally dimensioned larger than the socket (135);

a shoulder (144) of the peg portion (142) adjacent to the flange (143) wherein the shoulder (144) is laterally dimensioned to closely fit within the socket (135);

a first lateral wall (145) of the peg portion (142) that is recessed relative to the socket (135);

a peg spring (147) extending from the first lateral wall (145), and configured for biasing apart the first lateral wall (145) and the socket (135) when the peg portion (142) is positioned in the socket (135); and

a protrusion (148) extending laterally from a second lateral wall (146) of the peg portion (142) that is laterally opposed to the first lateral wall (145), wherein the protrusion (148) is dimensioned and shaped for mating with, and catching in, the latch hole (139), and the latch hole (139) is positioned to catch the protrusion (148) when the peg portion (142) is inserted into the socket (135) such that the flange (143) longitudinally abuts the socket (135).

10. The vehicle equipment rack of claim 9, further characterized by:

a beveled edge (154, 159) between the end hook (140) and the socket (135) for allowing the peg portion (142) to be tilted sufficiently to lever the protrusion (148) clear of the latch hole

(139).

11. The vehicle equipment rack of claim 9, further characterized by:

a spring (172) that is connected for biasing the peg portion (142) longitudinally inward into the socket (135).

12. The vehicle equipment rack of claim 9, further characterized in that:

the end hook (140) has a forward opening hook portion (149);

the first lateral wall (145) of the peg portion (142) faces forward;

the second lateral wall (146) of the peg portion (142) faces rearward; and

a spring (172) is connected for biasing the end hook (140) longitudinally inward.

13. The vehicle equipment rack of claim 12, further characterized in that:

the shelf (101) is attached to the guide portion (132);

the guide portion (132) is a tube having a rectangular cross-section;

two sliding portions (134a, 134b) are the two distal longitudinally outward ends of the hook bar assembly (130); and

both of the two sliding portions (134a, 134b) have rectangular cross sections and are telescopically engaged for sliding longitudinally within the guide portion (132).

14. The vehicle equipment rack of claim 13, further characterized in that:

the two sliding portions (134a, 134b) are tubular; and

one socket (135) is within the longitudinally outward end of each of the two sliding portions (134a, 134b).

15. The vehicle equipment rack of claim 13, further characterized by:

rectangular cross-sections for the guide portion (132) and the sliding portions (134a, 134b) wherein the fore-aft dimension is larger than the top-bottom dimension.

16. The vehicle equipment rack of claim 13, further characterized by:

a limit pin (134) that is secured near a longitudinal inward end of each of the sliding portions (134a, 134b); and

an extension limiter (178) with limit hooks (180) that are cooperatively engaged with the limit pins (134) for limiting outward extension of the sliding portions (134a, 134b).

17. The vehicle equipment rack of claim 1, further characterized by:

a limit pin (134) that is secured in one of the sliding portion (134) and the guide portion (132); and

an extension limiter (178) with limit hooks (180) that is attached to the other one of the sliding portion (134) and the guide portion (132), and that is cooperatively engaged with the limit pin (134) for limiting outward extension of the sliding portion (134).

18. The vehicle equipment rack of claim 1, further characterized by:

a tolerance bump (136) that extends between the guide portion (132) and the at least one sliding portion (134).

19. The vehicle equipment rack of claim 1, further characterized by:

5 a pivoting connection (120) of the shelf (101) to the hook bar assembly (130); and
pivot stops (124) for limiting the extent of shelf pivoting.

20. The vehicle equipment rack of claim 1, further characterized by:

a retaining post (122) that protrudes upward near a forward edge of the shelf (101);
an elastic cord (102) that is attached near a first side edge of the shelf (101) and has a
10 knot (103) at an end of the elastic cord (102) that is removably caught in a cord notch (104) in a
second side edge of the shelf (101) opposite to the first side edge, wherein the cord notch 104
opens outward at the second side edge; and

a strap (110) having a first end (111a) that is attached to a first side edge of the shelf
(101), and having a second end (111b) with hook-and-loop material that removably attaches to a
15 fastening pad (112) with a corresponding hook-and-loop material, wherein the fastening pad
(112) is affixed near the second side edge of the shelf (101).

21. The vehicle equipment rack of claim 1, further characterized by:

a non-slip top surface (108) of the shelf (101).

22. The vehicle equipment rack of claim 1, further characterized by:

20 a softened rearward edge (118) of the shelf (101).

23. The vehicle equipment rack of claim 1, further characterized by:

a compressible sleeve (188) removably hooked on the headrest post (322, 324) and
positioned between the end hook (140) and a headrest (320) supported by the headrest post
(322, 324).

25 24. The vehicle equipment rack of claim 1, further characterized by:

an audio transmitter (190) attached to the shelf (101); and

an audio cord (194) that is connected between the audio transmitter (190) and an audio
plug (196b) for plugging into the equipment (200).

25. The vehicle equipment rack of claim 1, further characterized by:

30 a power jack module (191) that is mounted on the shelf (101); and

a power cord (192) that is connected between the power jack module (191) and a power
plug (196a) for plugging into the equipment (200).

26. The vehicle equipment rack of claim 25, wherein the power jack module (191) is
further characterized by:

power conversion circuitry (193).

27. The vehicle equipment rack of claim 25, wherein the power jack module (191) is further characterized by:

power conditioning circuitry (193).

5 28. A method for removably mounting an equipment rack (100) within a vehicle, the method characterized by the steps of:

providing two end hooks (140) on distal longitudinally outward ends of the rack (100);
configuring each end hook (140) for hooking on a headrest post (322, 324) of the

vehicle; and

10 employing the end hooks (140) as sliding portions (134) that are telescopically engaged with a guiding portion (132) of the rack (100).

29. The method of claim 28, further characterized by the step of:

biasing the two end hooks 140 with respect to each other.

30. The method of claim 28, further characterized by the step of:

15 shaping inside walls of the end hook (140) for establishing two lines of contact between the end hook (140) and the headrest post (322, 324).

31. The method of claim 28, further characterized by the steps of:

biasing the end hook (140) longitudinally outward; and

shaping the end hook (140) for opening longitudinally outward.

20 32. The method of claim 31, further characterized by the step of:
providing V-shaped inside walls (161, 162) of the end hook (140) for removably and releasably holding the rack (100) on the headrest post (322, 324).

33. The method of claim 28, further characterized by the steps of:

biasing the end hook (140) longitudinally inward; and

25 sloping an inside wall (152) of the end hook (140) forward and longitudinally inward for removably and releasably holding the rack (100) on the headrest post (322, 324).

34. The method of claim 28, further characterized by the steps of:

biasing the end hook (140) longitudinally inward; and

30 sloping an inside wall (158) of the end hook (140) rearward and longitudinally inward for removably and releasably holding the rack (100) on the headrest post (322, 324).

35. The method of claim 28, further characterized by the steps of:

providing a socket (135), a peg portion (142), and a hook portion (149, 155, 160) at the longitudinally outward end of the end hook (140);

extending the peg portion (142) longitudinally inward from the hook portion (149, 155,

160);

shaping the peg portion (142) to releasably fit into the socket (135);

laterally biasing the peg portion (142) against the socket (135) when the peg portion (142) is in the socket (135); and

5 providing a catch system (139, 148) that releases in response to tilting the peg portion (142) in the socket (135).

36. The method of claim 28, further characterized by the step of:

preventing rotation of the end hook (140) around a first headrest post (324) by extending a bar (166) from the end hook (140, 155) longitudinally outward to reach at least longitudinally
10 outward of a second headrest post (322) when the end hook (140, 155) is hooked on the first headrest post (324).

37. The method of claim 28, further characterized by the step of:

preventing undesirable movement of the sliding portion (134) relative to the guiding portion (132) by forming tolerance bumps (136) between the sliding portion (134) and the
15 guiding portion (132) after they have been telescopically engaged.

38. The method of claim 28, further characterized by the step of:

preventing undesirable movement of the rack (100) by removably hooking a compressible sleeve (188) on the headrest post (322, 324) between the end hook (140) and a headrest (320) supported by the headrest post (322, 324).

20 39. A method for removably holding equipment (200) on a shelf (101) that is mounted within a vehicle (300) wherein the mounting includes attaching the shelf (101) to an approximately horizontal bar (130) that is attached within the vehicle (300), the method characterized by the steps of:

preventing horizontal movement of the equipment (200) by providing one or more posts
25 (122) protruding upward from the shelf (101); and

holding the equipment (200) down on the shelf (101) with a flexible strap (110) that is removably attached to the shelf (101).

40. The method of claim 39, further characterized by the step of:

trapping an approximately vertical portion (220) of the equipment (200) between the one
30 or more posts (122) and an elastic cord (102) that is removably attached to the shelf (101).

41. The method of claim 39, further characterized by the step of:

providing a non-slip top surface (108) of the shelf (101).